

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Sideroxylon reclinatum* ssp. *austrofloridense*

COMMON NAME: Everglades bully

LEAD REGION: 4

INFORMATION CURRENT AS OF: May 2010

**STATUS/ACTION:**

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☒ Non-petitioned

☐ Petitioned - Date petition received:

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species?

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): May 4, 2004

☐ Candidate removal: Former LP: ☐

☐ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

☐ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

☐ F – Range is no longer a U.S. territory.

☐ I – Insufficient information exists on biological vulnerability and threats to support listing.

☐ M – Taxon mistakenly included in past notice of review.

☐ N – Taxon does not meet the Act's definition of "species."

☐ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Sapotaceae, Sapodilla Family

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida, U.S.A.

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida,

Miami-Dade and Monroe Counties, U.S.A.

**LAND OWNERSHIP:** The largest population (14 occurrences) is located at Long Pine Key within Everglades National Park (ENP) (Gann et al. 2006, p. 11), which is managed by the National Park Service (NPS). Long Pine Key is approximately 8,029 hectares (ha) (19,839 acres (ac)). Another population (not surveyed) occurs within the NPS's Big Cypress National Preserve (BCNP) (K. Bradley, The Institute for Regional Conservation [IRC], pers. comm. 2007), the size of the area occupied is unknown. This species occurs at Miami-Dade County's Larry and Penny Thompson Park (Possley and McSweeney 2005, p. 1), which is approximately 93 ha (229 ac). Smaller occurrences are on private land, including some natural forest community (NFC) fragments (K. Bradley, pers. comm. 2007). The private Pine Ridge Sanctuary is 5.7 ha (14 ac), which is managed by conservation-minded landowners. It may be present in a few non-protected pinelands, such as Grant Hammock, but these areas need to be surveyed (Gann et al. 2002, p. 527).

**LEAD REGION CONTACT:** Erin Rivenbark, Atlanta Regional Office, 404-679-7379, [erin\\_rivenbark@fws.gov](mailto:erin_rivenbark@fws.gov)

**LEAD FIELD OFFICE CONTACT:** Paula Halupa, South Florida Ecological Services Office, 772-562-3909 ext 257, [paula\\_halupa@fws.gov](mailto:paula_halupa@fws.gov)

#### BIOLOGICAL INFORMATION

**Species Description:** Everglades bully is a decumbent or upright shrub, 3-6 feet (1-2 meters) tall. The branches are smooth, slightly geniculate, and somewhat spiny. Leaves are thin, obovate or ovate, 0.8-2 inches (2-5 centimeters) long, evergreen, oblanceolate, and fuzzy on their undersides. The flowers are in axillary cymes (Long and Lakela 1971, p. 679). Everglades bully is distinguished from the other two subspecies of *S. reclinatum* in Florida by its leaves, which are persistently pubescent (fuzzy) on their undersides, rather than smooth or pubescent only along the midvein (Wunderlin and Hansen 2003, p. 603).

**Taxonomy:** The genus *Sideroxylon* is represented by eight species in Florida. All of these plants were previously assigned to the genus *Bumelia*. *Sideroxylon reclinatum*, the Florida bully, is represented by three subspecies that range nearly throughout Florida and into neighboring states. The Everglades subspecies was first recognized by David Whetstone (1985, p. 544-547) as *Bumelia reclinata* var. *austrofloridense*. The Everglades bully was transferred to the genus *Sideroxylon* by Kartesz and Gandhi (1990, p. 421-427). The transfer of Everglades bully from *Bumelia* to *Sideroxylon* is presumably in accordance with Pennington's (1990, 1991) revision of the genera of the family Sapotaceae and constitutes a nomenclatural formality. Kartesz and Gandhi (1990, p. 421-427) made *Sideroxylon reclinatum* ssp. *austrofloridense* a subspecies rather than a variety; in plant nomenclature, the ranks of variety and subspecies are interchangeable, except in the situation where two or more varieties constitute a subspecies. This name is used in the current treatment of the Florida flora (Wunderlin and Hansen 2008, p. 1).

The Integrated Taxonomic Information System (2010, p. 1) indicates that the taxonomic standing for *Sideroxylon reclinatum* ssp. *austrofloridense* (Whetstone) Kartesz & Gandhi is accepted. The online Atlas of Florida Vascular Plants (Wunderlin and Hansen 2008, p. 1) uses the name *S.*

*reclinatum* ssp. *austrofloridense* (Whetstone), as does NatureServe (2009, p. 1). In summary, there is general agreement that *S. reclinatum* ssp. *austrofloridense* is a distinct taxon. We have carefully reviewed the available taxonomic information to reach the conclusion that the subspecies is a valid taxon.

Habitat: Everglades bully is restricted to pinelands with tropical understory vegetation on limestone rock (pine rocklands), mostly in the Long Pine Key area of ENP, which is an area of pine rockland surrounded by wetlands. In ENP, Everglades bully is found in pinelands, pineland/prairie ecotones, and prairies (Gann et al. 2006, p. 12). Plants are found in low elevation pinelands and pineland/marl prairie ecotones that flood each summer (Gann et al. 2006, p. 13). Plants are also present in BCNP, south of Loop Road, but the habitat has not been described and surveys have not been conducted (K. Bradley, pers. comm. 2007). The species was locally common at the edges of pine rockland and prairie when plants were collected at the very southern end of Lostman's Pines, close to the ENP boundary, in 2003 (Sadle, ENP, pers. comm. 2008). Occurrences in Miami-Dade County are within remnant pine rocklands.

Historical Range/Distribution: Everglades bully was long considered to be restricted to the tropical pinelands of Miami-Dade County. Gann et al. (2002, p. 526) provided a history of collections: Everglades bully was first documented at Camp Jackson near what is now the main entrance to ENP. It has been collected several times (starting in 1852) at Long Pine Key. The species has been observed in pinelands east of ENP, the Nixon-Lewis Hammock (where the pinelands have since been destroyed), privately-owned Grant Hammock, and privately-owned Pine Ridge Sanctuary.

In Monroe County, this species is found only on the mainland (Hodges and Bradley 2006, p. 42). Hodges and Bradley (2006, p. 42) stated that if it had occurred in the Florida Keys, the most likely locations would have been pine rocklands on Key Largo, Big Pine Key, Cudjoe Key or Lower Sugarloaf Key, all of which were surveyed for this species. Hodges and Bradley (2006, p. 42) indicated that most of the sites on Key Largo have been developed. There have been no records of this taxon ever being collected there.

Current Range/Distribution: One population occurs at BCNP south of Loop Road, the extent of which is not known, on the mainland portion of Monroe County (K. Bradley, pers. comm. 2007). The largest population is at Long Pine Key within ENP in Miami-Dade County (Hodges and Bradley 2006, p. 42; Gann et al. 2006, p. 11). New occurrences within ENP are expected to be found as work continues to establish the limits of this species' habitat requirements. Everglades bully appears to have a much wider range than previously thought (Gann et al. 2006, p. 9).

One occurrence is located at Larry and Penny Thompson Park in the Richmond Pinelands adjacent to the Metrozoo in Miami-Dade County (Gann et al. 2002, p. 527, Possley and McSweeney 2005, p. 1). This plant occurs at the privately-owned Pine Ridge Sanctuary in Miami-Dade County and possibly at a few non-protected pinelands, such as Grant Hammock (Gann et al. 2002, p. 526). More recently, Bradley (pers. comm. 2007) reports small occurrences in Miami-Dade County at the following locations: Lucille Hammock, South Dade Wetlands, NFC #P-300, and NFC #P-310.

Population Estimates/Status: In 2005, IRC reported that more than 10,000 plants were found in surveys of Long Pine Key (K. Bradley, pers. comm. 2005). The baseline abundance estimate at Long Pine Key based on a  $\log_{10}$  abundance estimate is 10,000-100,000 plants (Gann et al. 2006, p. 11). Gann et al. (2006, p. 11) found 14 occurrences of this species recorded at 149 stations. There is not a good estimate of the population size in BCNP. Bradley (pers. comm. 2007) indicates that this species was discovered within BCNP in 2003, and that 50-100 plants were observed, but the population has not been surveyed. Funding became available for a full survey last year, and a full survey within BCNP is planned to begin in May 2010 (see Conservation Measures Planned or Implemented).

Fairchild Tropical Botanic Garden (FTBG) tagged 41 groups of plants, each group consisting of 1 to 6 individuals, for a total of approximately 73 individuals at Larry and Penny Thompson Park (Possley and McSweeney 2005, p. 1). This is probably the largest population outside of Long Pine Key. Estimated population sizes for the other occurrences are as follows: Lucille Hammock (11-100 individuals), South Dade Wetlands (unknown), NFC #P-300 (2-10 individuals), and NFC #P-310 (11-100 individuals) (K. Bradley, pers. comm. 2007).

The rounded global status of Everglades bully is T1, critically imperiled (NatureServe 2009, p. 1). NatureServe (2009, p. 1) indicates that this taxon is a narrow, endemic subspecies occurring in sensitive and highly fragmented pine rocklands of southern Florida. Florida Natural Areas Inventory (FNAI) considers Everglades bully to have a global rank of G4G5T1, meaning the species as a whole is “apparently” or “demonstrably secure globally,” but the subspecies is “critically imperiled globally” (FNAI 2010, p. 9). Everglades bully was considered to be critically imperiled by IRC; however, based upon data collected in the first year of their study, IRC down-ranked this species to imperiled (Gann et al. 2006, p. 13; Gann et al. 2001-2008, p. 1). Everglades bully is not listed by the State.

## THREATS

- A. The present or threatened destruction, modification, or curtailment of its habitat or range.  
The Miami-Dade County pine rocklands have largely been destroyed by residential, commercial, and urban development and agriculture. Pine rocklands in the county (including patches of marl prairie) have been reduced to about 11 percent of their former extent (Kernan and Bradley 1996, p. 2). Of the estimated historical extent of 182,780 acres (74,000 ha), only 20,106 acres (8,140 ha) of pine rocklands remained in 1996. Outside of ENP, only about one percent of the Miami Pine Rock Ridge pinelands remain and much of what is left is in small remaining blocks isolated from other natural areas (Herndon 1998, p. 1).

Habitat loss continues to occur in the species' range and most remaining suitable habitat has been negatively altered by human activity. Miami-Dade County has developed a network of small public conservation lands and has encouraged conservation of natural vegetation on private land. The County's actions may have averted extirpation of this and other pineland plants. As a result, some opportunities exist to conserve this plant on private land in Miami-Dade County, but there is little opportunity to acquire more conservation lands. Conservation of privately owned pine rocklands in Miami-Dade County is largely a matter of County government cooperation with private landowners and the County offers incentives

for landowners to maintain their NFCs.

Everglades bully habitat at Long Pine Key in ENP (e.g., pinelands, pineland/prairie ecotones, and prairies [Gann et al. 2006, p. 12]) and BCNP are, for the most part, protected. The largest population is essentially protected from habitat loss due to development or agriculture; however effects from sea level rise, hydrological changes, and other natural and anthropogenic factors may still affect this species despite its protection on public conservation lands (see Factor E).

Any occurrences and suitable habitat remaining on private land are threatened by habitat loss and degradation, and threats are expected to continue with increases in Florida's human population. The human population within Miami-Dade County, which supports the majority of the remaining occurrences for this species, is currently greater than 2.4 million people, and the population is expected to grow to more than 4.0 million by 2060, an annual increase of roughly 30,000 people (Zwick and Carr 2006, p. 20). Few occurrences on private land remain, and with increases in human population and associated development pressures, these occurrences will likely be lost. Similarly, the likelihood of finding additional suitable habitat for the Everglades bully in Miami-Dade County is expected to diminish with increases in human population.

Climatic changes and sea level rise are major threats to south Florida, including this species and its habitat. Climatic change and sea level rise will likely be a factor over the long-term. Plants are found in low elevation pinelands and pineland/marl prairie ecotones that flood each summer (Gann et al. 2006, p. 13). The Intergovernmental Panel on Climate Change (IPCC) reported that the warming of the world's climate system is unequivocal based on documented increases in global average air and ocean temperatures, unprecedented melting of snow and ice, and rising average sea level (IPCC 2007, p. 2; 2008, p. 15). Sea-level rise is the largest climate-driven challenge to low-lying coastal areas and refuges in the sub-tropical ecoregion of southern Florida (U.S. Climate Change Science Program [CCSP] 2008, p. 5-31, 5-32).

IPCC (2008, p. 28) emphasized it is very likely that the average rate of sea-level rise during the 21<sup>st</sup> century will exceed that from 1961 to 2003 (i.e., 0.071 inches [0.18 cm] per year), although it was projected to have substantial geographical variability. Partial loss of the Greenland and/or Antarctic ice sheets could result in many feet (several meters) of sea-level rise, major changes in coastlines, and inundation of low-lying areas (IPCC 2008, p. 28-29). Low lying islands and river deltas will incur the largest impacts (IPCC 2008, p. 28-29). Because dynamic ice flow processes in ice sheets are poorly understood, timeframes are not known; however, modeling indicates that "more rapid sea-level rise on century timescales cannot be excluded" (IPCC 2008, p. 29). According to CCSP (2008, p. 5-31), much of low-lying, coastal south Florida "will be underwater or inundated with salt water in the coming century."

IPCC (2008, p. 3, 103) concluded that "climate change is likely to increase the occurrence of saltwater intrusion into coastal aquifers as sea level rises" and that "sea-level rise is projected to extend areas of salinisation of groundwater and estuaries, resulting in a decrease of

freshwater availability for humans and ecosystems in coastal areas.” From the 1930s to 1950s, increased salinity of coastal waters contributed to the decline of cabbage palm forests in southwest Florida (Williams et al. 1999, p. 2056-2059), expansion of mangroves into adjacent marshes in the Everglades (Ross et al. 2000, p. 9, 12-13), and loss of pine rockland in the Keys (Ross et al. 1994, p. 144, 151-155). Hydrology has a strong influence on plant distribution in these and other coastal areas (IPCC 2008, p. 57). Such communities typically grade from salt to brackish to freshwater species. Human developments will also likely be significant factors influencing whether natural communities can move and persist (IPCC 2008, p. 57; CCSP 2008, p. 7-6).

The Science and Technology Committee of the Miami-Dade County Climate Change Task Force (MDCCCTF) (2008, p. 1) recognized that significant sea level rise is a very real threat to the near future for Miami-Dade County. In a January 2008 statement, the MDCCCTF (2008, p. 2-3) warned that sea-level is expected to rise at least 3-5 feet (0.9 – 1.5 m) above current baseline within this century. With a 3-4 foot (0.9 – 1.2 m) rise in sea level (above baseline) in Miami-Dade County: “Spring high tides would be at about + 6 to 7 feet; freshwater resources would be gone; the Everglades would be inundated on the west side of Miami-Dade County; the barrier islands would be largely inundated; storm surges would be devastating; landfill sites would be exposed to erosion contaminating marine and coastal environments. Freshwater and coastal mangrove wetlands will not keep up with or offset sea level rises of two feet per century or greater. With a five foot rise (spring tides at nearly +8 feet), Miami-Dade County will be extremely diminished,” (MDCCCTF 2008, p. 2-3).

In summary, all known Everglades bully occurrences are at some risk to habitat loss and modification. Extant occurrences on private land are threatened by development. Overall threat level of habitat loss from development is moderate, since most sites, including the site with the largest population, are protected. Most occurrences are in low-lying areas and will be affected by rising sea level. Overall threat level of habitat loss from sea-level rise is currently low, but expected to become severe in the future.

- B. Overutilization for commercial, recreational, scientific, or educational purposes. Bullies, including the Everglades bully, are not likely to be collected for any purpose other than voucher specimens to document their distribution. Overutilization is not a threat.
- C. Disease or predation. None known.
- D. The inadequacy of existing regulatory mechanisms. This species is not listed in the State of Florida. Federal, State, and local laws have not been sufficient to prevent past and ongoing impacts to Everglades bully or its habitat on private land. While Miami-Dade County has purchased conservation lands and encouraged conservation of natural vegetation on private land, there are no regulatory mechanisms in place to prevent impacts to the Everglades bully and its habitat on private land; such impacts have occurred in the past and will continue to occur. Where this species occurs on public conservation lands, existing regulatory mechanisms of those management agencies may be considered adequate on those lands.
- E. Other natural or manmade factors affecting its continued existence. Fire suppression is a

significant threat to Everglades bully (Gann et al. 2002, p. 527). Fire maintains the pine rockland community. Under natural conditions, lightning fires typically occurred at 3 to 7-year intervals or more frequently in marl prairies. With fire suppression, hardwoods eventually invade pine rocklands and shade out understory species. Fire suppression has reduced the size of the areas that do burn and habitat fragmentation has prevented fire from moving across the landscape in a natural way. Thus, many pine rockland communities are becoming tropical hardwood hammocks.

Exotic species have altered the type of fire that occurs in pine rocklands. Historically, pine rocklands had an open, low understory where natural fires remained patchy, with relatively low temperatures, thus sparing many native grasses and shrubs. Dense exotic plant growth can create higher temperatures and longer burning periods. Pine rockland plants cannot tolerate these extreme conditions. As a result, the native plants may have to be conserved by removing exotics through methods other than burning. One such method, hand chopping followed by spot treatment, is labor intensive and very costly. Pinelands in Miami-Dade County outside of ENP are kept intact only by constant maintenance, including removal of exotic plants such as Burmese reed (*Neyraudia reynaudiana*), Brazilian pepper (*Schinus terebinthifolius*), and others, use of prescribed fires, and prevention or cleanup of dumped trash.

Long Pine Key and BCNP are susceptible to invasive exotic plants such as Burmese reed and Old World climbing fern (*Lygodium microphyllum*), which has spread southward into parts of ENP (Ferriter 2001, p. 15; Ferriter 2003, p. 1). The former agricultural lands of the Hole in the Donut adjacent to Long Pine Key are infested by exotics such as Brazilian pepper and common guava (*Psidium guajava*) and are a potential source of seeds of these exotic species. The NPS is restoring those former agricultural lands, but invasive exotic plants will continue to be a threat even after this restoration work is completed (J. Sadle, pers. comm. 2010).

In areas such as Larry and Penny Thompson Park, the water table is now lower than it was historically, which is possibly stressing the slash pines and other plants. Exotic plant control at Larry and Penny Thompson Park has been successful. The County policy to conserve pinelands on public lands is important to preventing encroachment into the Park's pine rockland. For example, after Hurricane Andrew, debris was disposed of on the Park's undeveloped pineland (no debris remains at present). The County stopped this practice and moved dumping to areas without important biological resources.

Hydrology is a key ecosystem component that affects rare plant distributions and their viability (Gann et al. 2006, p. 4). Historically, sheet flow from Shark River Slough and Taylor Slough did not reach the upland portions of Long Pine Key, but during the wet season, increased surface water flow in sloughs generated a rise in ground water across the region (Gann et al. 2006, p. 4). As artificial drainage became more widespread, however, regional groundwater supplies declined. Historical patterns of water flow through Long Pine Key are further confounded by road construction (Gann et al. 2006, p. 4). Water flow through Long Pine Key was originally concentrated in marl prairies, traversing in a north-south direction; however, construction of the main ENP road dissected Long Pine Key in an east-west direction, thereby impeding sheet flow across Long Pine Key (Gann et al. 2006, p.

4). Water was either impounded to the north of the main road or diverted around the southern portion of Long Pine Key through Taylor Slough and Shark River Slough (Gann et al. 2006, p. 4). Research Road may similarly affect the water supply of the southern portions of Long Pine Key (Gann et al. 2006, p. 4).

Gann et al. (2002, p. 527) and Herndon (1998, p. 2) expressed concern that changes to regional water management intended to restore the Everglades could negatively affect the pinelands of Long Pine Key. Gann et al. (2006, p. 5) stated that if hydrological restoration is successful, ground water levels will presumably be raised, wet season flows will return to marl prairies and fire intensities will decrease, and growing conditions for rare pineland and hammock plants will improve. Alternatively, implementation of Everglades restoration may also lead to further impoundment of water north of the main ENP road, possible flooding of rare plant populations, and a failure to provide relief to habitats on Long Pine Key that are compartmentalized (by the main ENP road and Research Road) and have been impacted from long-term drainage (Gann et al. 2006, p. 5). At this time, it is not known whether the proposed restoration and associated hydrological modifications will have a positive or negative impact on rare species within ENP, including Everglades bully (Gann et al. 2006, p. 2).

Everglades bully may be vulnerable to catastrophic events and natural disturbances, such as hurricanes. Hurricanes have impacted Miami-Dade County in the past (e.g., Hurricane Andrew). Three hurricanes made landfall in south Florida in 2005 (Katrina, Rita, and Wilma). According to the National Oceanographic and Atmospheric Administration, Miami-Dade County, the Keys, and western Cuba are the most storm-prone areas in the Caribbean so this threat is expected to continue.

In summary, Everglades bully is vulnerable to a wide array of natural and human factors, including: few and isolated occurrences, restricted range, fire suppression, invasive exotic plants, regional water management changes, and catastrophic events and natural disturbances, like hurricanes and extreme weather events.

#### CONSERVATION MEASURES PLANNED OR IMPLEMENTED

In 1979, Miami-Dade County enacted the Environmentally Endangered Lands Covenant Program, which reduces taxes for private landowners of pine rocklands and tropical hardwood hammocks who agree to not develop their property and manage it for a period of 10 years (Service 1999, p. 3-177). Miami-Dade County also purchases NFCs, including tropical hammocks and pine rocklands. The Miami-Dade Forest Resources Program has regulatory authority over pine rocklands and tropical hardwood hammocks and is charged with enforcing regulations that provide partial protection on the Miami Rock Ridge; including authority over all NFCs in the County (Service 1999, p. 3-177). In cooperation with the Service and IRC, Miami-Dade County funded a project to map the existing NFCs and inventory rare and sensitive plants species on these lands. This project was completed in 2006.

ENP and BCNP are conservation areas whose pinelands are managed to maintain the natural vegetation. Everglades restoration will consider the protection of Long Pine Key as water flow



into the surrounding Everglades wetlands is restored. The NPS has worked to control exotic plants on its south Florida lands.

In 2005, the Service funded IRC through the Private Stewardship Grant Program to facilitate restoration and management of privately owned pine rockland habitats in Miami-Dade County. Restoration efforts included exotic plant control, light debris removal, hardwood management, and reintroduction of pines. Management plans included recommendations for prescribed burning, debris cleanup, exotic plant control, and hydrological restoration. This project has been completed.

Attempts to increase *ex situ* collections by FTBG and collect Everglades bully have not been successful thus far; however, FTBG will continue checking the population for ripe and viable seeds (Maschinski et al. 2005, p. 3).

In 2009, the South Florida Ecological Services Office received funding from the Service's Southeast Regional Office for a project proposal to determine the population size, extent of habitat, and possible threats to Everglades bully and Florida pineland crabgrass (*Digitaria pauciflora*) within BCNP. With this funding, the IRC will survey a 13,000 ha (32,124 ac) area. It is possible that the extent of habitat and population size within BCNP is significant, and larger than previously thought. Determining the population size, extent of habitat, and threats is fundamental to understanding species' status and conservation needs. It is possible that the populations and habitat in BCNP, coupled with the other populations and habitat on public lands, may be sufficient to ensure protection of the species in the long-term, such that listing is not necessary. Once the extent of habitat is determined and populations are assessed and mapped, the Service plans to work with the NPS and IRC to remove or reduce threats (e.g., fire suppression, changes to hydrology) through management.

#### SUMMARY OF THREATS

Pine rocklands in Miami-Dade County have largely been destroyed by residential, commercial, and urban development and agriculture. Most remaining suitable habitat has been negatively altered by human activity. While privately owned pine rocklands are at risk to development, Everglades bully habitat at ENP, BCNP, and county-owned lands are, for the most part, protected. Climatic changes and sea level rise will likely be a factor over the long-term; these factors are expected to impact pine rocklands and ultimately reduce the extent of available habitat. This species is threatened by habitat loss and degradation due to fire suppression, the difficulty of applying prescribed fire to pine rocklands, and exotic plants. Hydrology has been altered within Long Pine Key due to artificial drainage, which lowered ground water, and construction of roads, which either impounded or diverted water. Regional water management intended to restore the Everglades could negatively or positively affect the pinelands of Long Pine Key, where the largest population occurs. Hydrologic restoration could improve conditions for pineland plants; however, components of Everglades restoration may also negatively affect this species. At this time, it is not known whether the proposed restoration and associated hydrological modifications will have a positive or negative effect on Everglades bully. The population in BCNP and potential threats have yet to be assessed. However the Service plans to work with the NPS and IRC to remove or reduce threats through management. Everglades bully may be vulnerable to catastrophic events and natural disturbances, such as hurricanes. We find

that this species is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

For species that are being removed from candidate status:

\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

#### RECOMMENDED CONSERVATION MEASURES

- The primary conservation measures are to conserve pine rocklands and suitable habitat through purchase or conservation easements, restore understories by removing exotic plants or hardwoods, and provide regular prescribed burns to sites to maintain suitable habitat conditions.
- Monitoring and management of the remaining small populations in Miami-Dade County is essential.
- Additional surveys in BCNP are needed to determine size and distribution of population, extent of habitat, and threats. A survey of BCNP is planned to begin in May 2010.
- Additional surveys in ENP are needed. New occurrences within ENP are expected to be found as work continues to establish the limits of this species' habitat requirements.
- Continued monitoring at Long Pine Key is important to determine effects (positive or negative) from Everglades restoration and other hydrologic manipulations and changes.

#### LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
<b>Moderate to Low</b>	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	<b>Non-imminent</b>	Monotypic genus	10
		Species	11
		<b>Subspecies/population</b>	12*

Rationale for listing priority number:

*Magnitude:* Privately owned pine rocklands supporting this plant are at risk to development, but

occupied habitats within ENP, BCNP, and County-owned lands are largely protected. Overall threat level of habitat loss from development is moderate, since most sites are protected. Most occurrences are in low-lying areas and will be affected by rising sea level. Overall threat level of habitat loss from sea-level rise is currently low, but expected to become severe in the future. This species is threatened by habitat loss and degradation due to fire suppression, the difficulty of applying prescribed fire to pine rocklands, and exotic plants; however, efforts are underway to address these threats at some protected sites. We consider these threats moderate. Hydrologic alteration in the past has impacted Long Pine Key, the site of the largest population. At this time, it is not known whether Everglades restoration and associated hydrological modifications will have a positive or negative impact on the Everglades bully. Plants at ENP are considered to be abundant. The Everglades bully may be vulnerable to catastrophic events and natural disturbances, such as hurricanes. This threat is considered low, since a large population exists at ENP and another population occurs at BCNP. Overall, the magnitude of threats is considered moderate.

*Imminence:* Threats from habitat loss due to development currently exist at remaining privately owned pine rockland fragments, and these are considered imminent. However, the majority of the Everglades bully occurrences are on protected, public lands within ENP and other Federal and County lands. Therefore, threats due to habitat loss from development are considered non-imminent. Sea level rise is occurring, but considered a long-term threat since we do not have evidence that it is affecting any population. The threats from invasive exotic plants place constant pressure on the pineland habitat and have the potential to change fire regime; however, efforts are underway to combat this issue on many conservation lands. The threat from exotics to this species outside of ENP is considered imminent and more difficult to address, but the threat to the large population within ENP is considered non-imminent. Hydrologic alterations have impacted Long Pine Key in the past. Planned Everglades restoration and associated hydrologic changes will likely affect this species in the future. At this time, the extent of potential negative impacts, if any, is unknown. Threats from hurricanes are considered non-imminent due to population size and multiple occurrences. Overall, threats are considered non-imminent.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. Threats are moderate and are being addressed by land managers.

**DESCRIPTION OF MONITORING:** Monitoring of this species is being actively conducted in ENP by IRC. Through the Critical Ecosystems Study Initiative, a 5-year study was funded to: (1) survey and map the 30 rare species identified in Gann et al. (2002, p. 1-1056), (2) establish a long-term monitoring program to evaluate population responses of these species to Everglades restoration, and (3) augment or reintroduce populations of select species, if warranted (Gann et al. 2006, p. 2). Data from this study indicate that the population at Long Pine Key is abundant (Gann et al. 2006, p. 13).

FTBG, in cooperation with IRC, has mapped the population of Everglades bully at Larry and Penny Thompson Park (Possley and McSweeney 2005, p. 1). FTBG and IRC have tagged plants

and constructed a detailed map (Possley and McSweeney 2005, p. 1).

IRC has conducted field work that identified a number of new localities of Everglades bully in BCNP. However, additional survey and monitoring work is needed there. A survey of BCNP is planned for May 2010.

The Service completed a project with IRC and Miami-Dade County to map public and many private NFCs for the County's geographic information system. This project provided a list of plant species for each site. The project enables the County to manage information on pinelands and detect changes in their extent.

In 2005, the Service funded IRC to conduct a survey to determine the distribution and population size of Everglades bully and four other candidate plant taxa in the Florida Keys. This study concluded that Everglades bully does not occur in the Florida Keys (Hodges and Bradley 2006, p. 1-79).

#### COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Florida Department of Agriculture and Consumer Services, National Park Service, Service (National Wildlife Refuges), Florida Department of Environmental Protection, Miami-Dade County, Florida Fish and Wildlife Commission, FNAI, IRC, Historic Bok Sanctuary, The Nature Conservancy, FTBG, Archbold Biological Station, NatureServe, University of Central Florida, Florida International University, University of Florida, Princeton, members of the Rare Plant Task Force, botanists, and others. In total, the previous assessment was sent to approximately 200 individuals.

The State of Florida does not include plants in its State Wildlife Action Plan.

Indicate which State(s) did not provide any information or comments: Florida.

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:  June 15, 2010  
for Regional Director, Fish and Wildlife Service Date

Concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Do not concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: May 3, 2010

Conducted by: Paula Halupa, South Florida Ecological Services Office